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STAKEHOLDER'S PERCEPTION ON REMOTE PROCTORED EXAMINATION IN HIGHER EDUCATIONAL INSTITUTIONS: INSIGHTS FROM LAUTECH OPEN AND DISTANCE LEARNING CENTRE

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ABSTRACT

Every stakeholder involved in digital assessment has preferences directly related to how they view the advantages and potential risks of doing so. While digital assessment has many advantages, its versatility and flexibility make it look susceptible to exploitation and misconduct, mainly when utilised by stakeholders who lack integrity, which could affect the acceptance and adoption of this technology. This study aims to investigate the key elements influencing the adoption and implementation of online proctored assessments by the educational stakeholders within the chosen university. A survey tool was used to collect data by stratified random sampling from stakeholders, including students and academic staff. Focusing on remotely proctored examinations, the survey questions were developed using the Innovation Diffusion Theory (IDT) and Unified Theory of Acceptance and Use of Technology (UTAUT2) model constructs to ascertain stakeholders' preferences for adopting remote digital assessment. A quantitative analysis methodology was used to test our present theoretical model and determine the causality between variables of the constructs employed. The result of the analysis showed that "Performance Expectancy" (0.27), "Social Influence" (0.177), and "Personal Innovativeness" (0.161) have the highest positive standardised coefficients, indicating that they have the strongest positive relationship with "Behavioural Intention" to adopt remote proctored examination. This study's findings will likely make it easier to pinpoint areas of particular relevance that may be used to spur all parties' interest and accelerate the implementation of remotely proctored examinations in higher education institutions (HEI).

Keywords: Remote proctored examination, unified theory of acceptance and use of technology, innovation diffusion theory, technology acceptance.

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INTRODUCTION

Assessment plays a crucial role in the learning process, it gives tangible proof of what is learned, gauges student progress, and indicates a grasp of the subject content (Popham, 2003). For centuries, pen-to-paper has been the most employed mode of assessment delivery to evaluate learners and measure educational achievements in all forms of education, from elementary to tertiary. However, the past three decades have witnessed a sporadic yet progressive transition in the modalities and structures of assessments (Hunsu, 2015; Guimarães et al., 2018; Jia et al., 2022; Elosua et al., 2023). The arrival and introduction of computers in the early 90s and their generational evolution over time, introducing new features and capabilities, have led to the development and usage of what is now popularly referred to as "digital assessment" (Boitshwarelo et al., 2017; Tran et al., 2021). As technology develops, new and creative digital assessment approaches are being created to evaluate learners utilising various digital tools such as multimedia, gamification, collaborative tasks, personalised feedback, and real-world application to support a more engaging and effective educational experience (Ndibalema, 2021). In addition to the technological advancements, studies have linked a rise in student enrolment in educational institutions as another factor contributing to the transition from paper-based assessments to digital ones. This shift is due to the rising resources needed for grading and providing feedback to a larger number of learners in different courses (Jonsdottir et al., 2017). Research has shown that digital technologies may assist in revolutionising education, as it tends to be a more student-centred and technology-mediated method of learning (Alessio et al., 2017; Boldyrevskii et al., 2022; Keane et al., 2022; Mari State University et al., 2022). It offers potentially advantageous qualities such as affordances and provides more individualised, flexible, and palatable experiences to the learners (Keane et al., 2022). The increasing reliance on RPE in the post-COVID-19 educational landscape has raised concerns among faculty and academic administrators regarding the validity and security of the assessment process. While RPE offers advantages such as flexibility and convenience, there are lingering uncertainties about the impact on academic staff experiences, student experiences and broader educational objectives. Additionally, technical challenges, including internet connectivity issues and power availability, particularly in developing nations, pose potential threats to the reliability of assessment results. This study aims to explore the perceptions of educators and students through the lens of the proposed combination of IDT and UTAUT2 model, aiming to understand the factors influencing the acceptance and use of RPE and their implications for academic integrity, student experiences, and broader educational objectives.

Literature Review

In Nigeria, before the COVID-19 outbreak, higher education institutions had only limited adoption of digital assessments, with the majority of institutions only using the most basic version, a computer-based test (CBT) with multiple-choice questions. When the pandemic hit, the move to digital or online education became necessary due to the movement lockdown enforced by numerous governments worldwide (Shao, 2020). Within the shortest time, there was a proliferation of digital tools and technology platforms, leading to significant changes in the organisation of the educational sector, including learning methodologies, teaching, and administrative strategies, and assessment methodology (EY India, 2021). Digital assessments gained popularity due to their ability to address the aforementioned lockdown constraints as well as the benefits they provide such as remote administration, personalisation of learning resources, automation of learning processes, and instant feedback to all stakeholders (Alruwais et al., 2018). As a result, within minimal time, educational institutions began utilising robust

forms of online assessments such as simulation-based assessments and proctored exams to evaluate educational outcomes and assess students' knowledge and skills. Proctored assessments became a crucial technology for evaluating students during and after the pandemic, resulting in a "new normal" that transformed the educational experience for future generations (Kharbat & Abu-Daabes, 2021).

RPE refers to an online assessment in which a student participates in an exam from a remote location. To prevent cheating, this mode of exam is usually invigilated either by a human via a webcam, microphone, and other digital tools (Cherry et al., 2021) or through the use of an artificial intelligence (AI) powered agent that monitors examinee activities (Paredes et al., 2021). Of both modes of proctoring, AI-based RPE is preferred as it eliminates the need for a human supervisor, amid personnel shortages and it accommodates flexible schedules (Paredes et al., 2021). Some of the features introduced in RPE software to ensure exam integrity and prevent cheating include screen and webcam monitoring. Students' PCs with webcams and microphones are turned on to record and monitor their activities and verify their identities using face recognition both before and during live exams. Other features such as screen recording, browser lock, posture, and head angle monitoring are some of the other features of RPE (Nigam et al., 2021; Paredes et al., 2021; Raman et al., 2021).

Studies have investigated the validity and reliability of remotely proctored examinations in comparison to traditional, or face-to-face examinations, and some of the findings suggest that RPE can provide similar levels of security and validity as much as traditional proctored examination (Weiner & Hurtz, 2017; Cherry et al., 2021). However, concerns have also been raised about the technical issues that could arise, such as the availability and affordability of adequate internet connectivity problems, and poor power availability, especially in developing nations, which can negatively impact the validity of the examination results if participants face such challenges (Ishtiaq et al., 2022). Marais (2022) attempted to holistically understand how academics perceive academic integrity in RPE, he reported bias and critiques of proctoring approaches as many academics complained about the enormous workload placed on them, particularly in human-proctored RPE. The question of who is in charge of cross-checking participants' identities, flagging students who are allegedly cheating, reviewing recorded media of students' screens, and putting together cases to be presented to the disciplinary committee are some of the concerns raised (Marais, 2022). From the viewpoint of the students, some stakeholders felt RPE is a form of power play that gives academicians and the institution control over students, in that several RPE features can likely make students nervous throughout the test process. The issues of privacy and human rights infringement were also reported (Langenfeld, 2020; Khalil et al., 2022; Scassa, 2022).

Post-COVID-19 research has found that faculty and academic administrators are becoming hesitant to continue adopting RPE due to concerns about the validity and security of the assessment process (Akaaboune et al., 2022; Paredes et al., 2021). While adopting these technologies is necessary during the COVID-19 pandemic period, researchers believe it is vital to pause and think about the broader effects of implementing such technological "solutions" and examine how technology and assessment processes intersect with the broader objectives of education (Fawns & Schaepkens, 2022). Students, on the other hand, have mixed opinions, with some commending the flexibility, convenience, and positive exam experience availed by RPE (Paredes et al., 2021; Lee & Fanguy, 2022), while others feel that RPE is invasive and uncomfortable (Alessio et al., 2017; Kharbat & Abu-Daabes, 2021; Vasiliki et al., 2021). The effects of RPE on student outcomes, including

performance, motivation, and engagement, have also been studied. Some of these studies have found that RPE has a favourable effect on student motivation and engagement (Alessio et al., 2017; Cherry et al., 2021; Boldyrevskii et al., 2022), Others, however, have found no discernible difference between a remote and a conventional proctored exam (Vasiliki et al., 2021).

Theoretical Framework

In the absence of coercion, the adoption of complex, new technologies such as RPE is always slow, uncertain, and sometimes risky (Cho & McCardle, 2009). Most of the time, these technologies are implemented with an expectation that is weighed against the cost, which might not necessarily be monetary (Heidenreich & Talke, 2021). The degree of ignorance, reluctance to change, worry about making the wrong decision, technological inadequacy, and other strange factors can also have an odd impact on how people accept new technologies. The literature on technology adoption has proposed several models to explain user behaviour in adopting and using information technology and one of the most employed models is the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al., 2003), which employs human psychology and sociology characteristics to explain a user's intent to accept a technology and subsequent usage behaviour. The UTAUT model was initially composed of four constructs: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Condition. Later, however, (Venkatesh et al., 2012) identified important new constructs and relationships that were incorporated into UTAUT, modifying it to fit a consumer use context model. This model was named UTAUT2 (Venkatesh et al., 2012).

UTAUT2 is typically adequate and employed in many technology adoption estimation kinds of research; however, it was found insufficient due to the peculiarities of RPE and its features. To establish a more complete measurement of new technology acceptance, Dwivedi et al. (2019) suggested including some of the constructs from the IDT (Zhang et al., 2008) in the UTAUT2 model (Venkatesh et al., 2012). The IDT was proposed by Rogers & Cartano (1962) to evaluate how new ideas and technologies spread within a social system over time. In an attempt to explore earnestly the full spectrum of variables that drive RPE acceptability in higher education institutions and present a more complete picture of the factors that might influence this technology adoption, this research hybridised constructs from both UTAUT2 and IDT as the proposed technology acceptance model.

In this study, the latent variables related to technology acceptance behaviour were derived from established research on IDT and UTAUT2. The adaptation of these measures allowed for a systematic approach to examining the technology acceptance behaviour of the participants. Figure 1 shows the framework of the variables used in this research. It comprised eight exogenous constructs which are Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Image (IM), Hedonic Motivation (HM), Price Value (PV), Personal Innovation (PI), Facilitating Conditions (FC), and one endogenous construct i.e., Behavioural Intentions (BI). The explanation of the proposed model construct is presented in Table 1.

Table 1: Proposed model constructs

Constructs	Explanation
PE	PE is characterised by an individual's confidence that utilising new technology will enhance their performance to attain job-related benefits. In this investigation, PE pertains to the academic staff and learners' conviction that utilising an RPE will aid them in accomplishing their goals with greater effectiveness and efficiency.

EE	EE is defined as the belief that an individual's interaction with the information system will be uncomplicated and trouble-free.
SI	SI refers to external influences, such as peer or supervisory pressure, encouragement from the faculty, and so on, that affect stakeholders' perceptions of system use.
IM	IM refers to how new technology, in this case, RPE, is perceived by stakeholders in terms of its characteristics, benefits, and potential drawbacks.
HM	HM is described as the fun or pleasure resulting from using a particular technology, and it is predicted to have a direct influence on technology acceptance and use.
PV	PV refers to an individual's cognitive trade-off between the perceived benefits of using a system and the amount spent.
PI	Personal innovativeness is a stable personality trait that makes individuals desire to try out new technological advancements.
FC	FC refers to the extent to which an individual believes that organisational support and infrastructure are available to support the system's use.
BI	BI refers to the behavioural readiness to accept, Use or adopt a particular technology.

Source: (Venkatesh et al., 2012; Zhang et al., 2008)

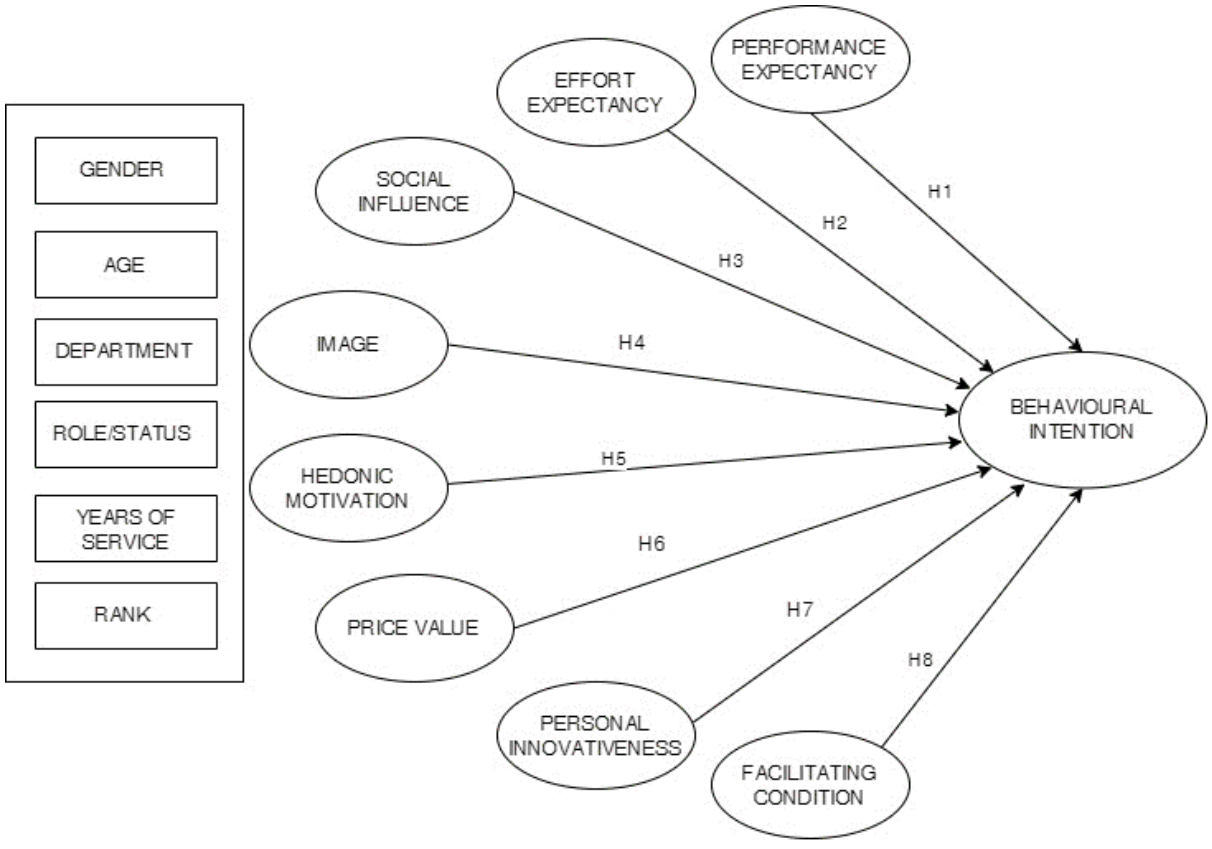

Figure 1: The proposed research model

Hypothesis

A hypothesis is seen as a study solution to a problem that is still a speculation since it has to be proven. This study proposes various hypotheses to explain what factors affect the utilisation of remotely proctored exams in higher education institutions based on the proposed model (See Table 2).

Table 2: Hypothesis

H1	Performance expectancy positively affects the behavioural intention to use RPE.
H2	Effort expectancy positively affects the behavioural intention to use remote RPE
H3	Social Influence positively affects the behavioural intention to use RPE
H4	Image positively affects the behavioural intention to use RPE
H5	Hedonic motivation positively affects the behavioural intention to use RPE
H6	Price Value positively affects the behavioural intention to use RPE
H7	Personal innovation positively affects the behavioural intention to use RPE.
H8	Facilitating conditions positively affect the behavioural intention to use RPE.

Methodology

Empirical data was collected through a self-administered questionnaire distributed via Google Forms. The participants consisted of academic staff and learners of the Ladoke Akintola University of Technology Open and Distance Learning Centre (LODLC) in Nigeria, who were selected as they represent primary stakeholders in this research context. LODLC was selected due to its dual-mode lecture delivery and extensive experience with RPE, offering a rich context to explore stakeholders' perspectives on RPE implementation. Participants were selected using a stratified random sampling method to share their experiences and opinions on RPE through closed-ended questionnaires. The calculated sample size for the survey was 365 using Cochran's formula. However, only 197 participants responded. The collected data were analysed using descriptive analysis, while inferential statistics such as correlation and multiple regression analysis were employed to analyse the formulated hypothesis. All analyses were done at a 95% confidence level. Ethical considerations in questionnaire administration were upheld by ensuring voluntary participation, confidentiality of responses, and obtaining informed consent from participants.

Data Analysis

A demographic study was conducted to learn more about the characteristics of the participants. Then, descriptive statistics were generated for the sample. Multivariate regression analysis was employed to examine the proposed hypotheses. This study used the correlation matrix analysis and multivariate regression analysis approach to examine the interrelationships among the variables and how multiple independent variables collectively influence a single dependent variable. It provides a more comprehensive view of the combined effects of different factors, allowing for a deeper understanding of the relationships in the data. This enhanced analysis improves the precision and accuracy of statistical modelling and the insights derived from it. IBM SPSS version 26 was used for data analysis.

Result

This section presents the result of the analysis of the data collected from the respondents.

Reliability test

Reliability tests were run on the gathered data to ensure measurement stability and consistency and to provide users with confidence in the dataset's dependability.

Table 2: Reliability test

Factors	Cronbach's Alpha
Performance Expectancy	0.929
Effort Expectancy	0.925
Social Influence	0.831
Facilitating Condition	0.148
Hedonic Motivation	0.871
Price Value	0.741
Image	0.893
Personal Innovation	0.679
Behavioural Intention	0.722

Source: Authors Computation (2024)

The findings of the reliability study show that the variables under consideration exhibit various degrees of internal consistency. Performance Expectancy (0.929), Effort Expectancy (0.925), Social Influence (0.831), Hedonic Motivation (0.871), and Image (0.893) are high-reliability variables with values that are near to 1. Moderate reliability factors are Behavioural Intention (0.722) and Price Value (0.741). Although Personal Innovation (0.679) has a value below the generally agreed lower limit of 0.70 for Cronbach's alpha, it is still considered acceptable by Taber (2018) and Hair et al. (2006), who stated that Cronbach's alpha value of 0.679 falls within the range of acceptable value. Therefore, Personal innovativeness is acceptable in this study. Cronbach's alpha value for the Facilitating Conditions factor is 0.148, well below the generally accepted lower limit of 0.70.

Consequently, it will not be considered in our analysis. The overall reliability for all the instruments is 0.87. This means high internal consistency exists for all the models' instruments.

Descriptive Data

As indicated in Table 3, the total number of participants in this study was 197; 59.4% of the participants were male, and 40.6% were female. The largest age group was found to be in the 26 to 30 range, representing 19.8% of the respondents. The participants had diverse academic backgrounds, with the largest group being in the field of computer science/IT/technology (27.9%). 36.5% of the participants had prior experience with RPE, while 63.5% had not. 67.0% of participants are students and 33.0% are staff. The largest group among academic ranks is assistant lecturers/lecturer II (11.2%) followed by senior lecturers (8.1%). These findings indicated that the majority of the stakeholders in the selected higher institutions are fairly represented.

Table 3: Demography

		Frequency	Percentage
Gender	Male	117	59.4
	Female	80	40.6
Age	15 to 19	6	3.0
	20 to 25	34	17.3

	26 to 30	39	19.8
	31 to 35	27	13.7
	36 to 40	31	15.7
	41 to 45	16	8.1
	46 to 50	15	7.6
	Above 50	29	14.7
Area of Specialisation	Agriculture	12	6.1
	Environmental Sciences	3	1.5
	Arts	3	1.5
	Humanities and Social Sciences	12	6.1
	Computer Sc./IT/Technology	55	27.9
	Education	26	13.2
	Engineering	8	4.1
	Accounting Management and Commerce	23	11.7
	Natural Sciences	7	3.6
	Health Sciences	38	19.3
	Applied Sciences	10	5.1
Have you done or involve in an RPE?	Yes	72	36.5
	No	125	63.5
Status	Student	132	67.0
	Staff	65	33.0
Rank	Student	132	67.0
	Assistant Lecturer/Lecturer II	22	11.2
	Lecturer I	10	5.1
	Senior Lecturer	16	8.1
	Professor	10	5.1
	Others	7	3.6

Source: Authors Computation (2024)

Correlation Analysis

Table 4 presents the pairwise correlations among the factors considered. Based on the values in the matrix, The correlation coefficients range from 0.497 to 0.838, such that the highest correlation coefficient is between PE-EE and SI-HM (0.838, 0.772 and 0.801). PV is also strongly correlated with HM and IM. BI is strongly correlated with PV, and PI is strongly correlated with SI and BI. Indicating a strong positive association between these variables. This indicates that all correlations between the dependent and independent variables were both strong and moderate, and they all had positive linear associations that were significant at 0.01 ($p<0.01$).

Table 4: Correlation matrix

	PE	EE	SI	HM	PV	BI	PI	IM
PE	1							
EE	.838**	1						
SI	.772**	.701**	1					
HM	.801**	.739**	.774**	1				
PV	.761**	.746**	.761**	.788**	1			

BI	.756**	.696**	.744**	.741**	.735**	1		
PI	.497**	.506**	.587**	.530**	.546**	.600**	1	
IM	.638**	.673**	.630**	.695**	.700**	.661**	.622**	1

**. Correlation is significant at the 0.01 level (2-tailed).
Source: Authors Computation (2024)

Multiple Regressions of BI against PE, EE, HM, PV, PI and IM
Table 5 shows the regression model summary. The R Square (R^2) value is 0.692, which means that a 69.2% change in Behavioural intention is due to changes in the PE, EE, HM, PV, PI, and IM. A significant correlation (p= 0.000) was found between the dependent variable (BI) and the independent variables (PE, EE, HM, PV, PI, and IM) in the ANOVA summary.

Table 5: Regression model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.832a	0.692	0.680	0.77629

a. Predictors: (Constant), Image, Personal Innovativeness, Performance Expectancy, Social Influence, Price Value, Hedonic Motivation, Effort Expectancy
Source: Authors Computation (2024)

Table 6 shows the result of multiple regression for the model analysis. Eight (8) independent variables were used to predict the behavioural intention to use RPE. It was observed that four of the independent variables were significant in predicting behavioural intention to use RPE. According to the results, PE (0.27) and SI (0.177) have the highest positive standardised coefficients, indicating that they have the strongest positive relationship with "Behavioural Intention." The "PI" (0.161) also has a positive relationship with the dependent variable, with a p-value of less than 0.05, indicating that it is statistically significant. EE (0.008), HM (0.125), PV (0.142), and IM (0.086) have much weaker or no significant relationship with the dependent variable.

Table 6: Regression model

Model		Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	0.355	0.166		2.141	0.034
	PE	0.113	0.038	0.270	3.015	0.003
	EE	0.003	0.034	0.008	0.100	0.921
	SI	0.083	0.035	0.177	2.355	0.020
	HM	0.105	0.068	0.125	1.541	0.125
	PV	0.124	0.067	0.142	1.844	0.067
	PI	0.137	0.047	0.161	2.94	0.004

IM	0.053	0.040	0.086	4 1.310	0.192

a. Dependent Variable: Behavioural Intention
Source: Authors Computation (2024)

Discussion

Using the proposed technology acceptance model as a theoretical lens, the main goal of this study is to investigate how educators and students view the RPE in the selected institution of study. PE was the most powerful predictor of BI on stakeholders' perception of the adoption of RPE. This was following the findings of previous research (Alwahaishi & Snasel, 2013; Chao, 2019; Dwivedi, Rana, et al., 2019). This means that the stakeholders believed that the RPE technology helps in saving time and effort, as well as providing a secure, reliable, and efficient exam experience. This is in support of H1 that PE positively affects BI.

The result of SI (the influence of others, such as peers or colleagues, on the individual's decision to adopt the technology) on BI was significant, indicating its significant effect on stakeholders' acceptance of RPE, which is in support of H3. This result agrees with the finding of VanDerSchaaf et al. (2023) who reported that SI stands out as a critical influence on behavioural intention to adopt the software for accessing university services. This is in contrast to the report of Gunasinghe et al. (2019) who stated that social influence and personal innovativeness in information technology were not significant predictors of e-Learning. This difference could be a result of interpersonal relationships among the considered stakeholders.

PI, or the individual's willingness to try new things, also has a positive and statistically significant relationship with the intention to use RPE, H7 (Chao, 2019). On the other hand, the results suggest that other factors such as EE, IM, HM, and PV have weaker or no significant relationship with the adoption of RPE, therefore, H2, H4, H5 and H6 were rejected. This could be a result of perceived risks such as uncertainties and potential negative perception of adopting RPE which may cause the stakeholders to be hesitant in embracing the technology even if it promises improved performance (Choe et al., 2021; Ali et al., 2022).

This indicates that while PE, SI, and PI are significant factors in the adoption of RPE, other factors have less of an effect or may not be as significant. Nevertheless, the remaining 31.8% of unexplained variance could be further investigated by increasing the latent or observed variables in the construct.

The findings suggest that academic staff and learners of LODLC perceptions of RPE are largely dependent on PE, SI and PI In predicting technology acceptance, this study contributes to the theory of RPE adoption from the perspective of the academic staff and learners. Therefore, LODLC should create a social norm that supports the adoption of RPE by promoting and encouraging its use among academic staff and learners. Likewise, influencing opinion leaders and experts in shaping their perception and adoption of RPE cannot be underestimated. LODLC can leverage their reputation and expertise to influence the opinions of opinion leaders and experts in the field by partnering with leading organisations and promoting the use of RPE.

Conclusion and Implications

This study provides insight into the adoption of RPE in the selected higher education institution by integrating UTAUT2 and IDT construct to establish a relationship with the BI of stakeholders. The study examined some hypotheses and discovered that PE (the belief that the technology can accurately assess knowledge and skills), SI (the influence of others on adoption), and PI (the willingness to try new things) are the most important factors in the adoption of RPE among stakeholders. EE, HM, PV, and IM were found to have weaker or no significant relationship with adoption. In other to improve stakeholders' acceptance of RPE, LODLC should dedicate more effort to increasing PE, SI, and PI and partner with leading organisations in RPE to influence the opinions of opinion leaders and experts. Policymakers in the institution should incorporate the identified factors that have a significant effect on the BI of the stakeholders into RPE guidelines to improve the perception of RPE adoption. Training programs and awareness campaigns on RPE should address concerns related to PE, and SI, and foster a culture of innovation. Continuous evaluation and adaptation of RPE approaches are essential to align with evolving technology and educational practices.

Limitation of the Study

Due to the limited time and scope, the study encountered certain limitations. The study employed a quantitative survey methodology, capturing data at a single point in time and the perception of the considered stakeholders could change over time due to new information and experience, therefore, future studies could employ a longitudinal design to obtain more accurate findings. Likewise, the study has focused entirely on a single institution, Ladoke Akintola University of Technology Open and Distance Learning Centre (LODLC) and the study's findings may primarily reflect the unique characteristics, policies, and technological infrastructure of LODLC, limiting the generalisation of findings to other institutions or educational settings.

Declaration of Interest Statement

There is no conflict of interest in this research work.

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Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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